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AN EXPLORATION OF THE RELATIONSHIP BETWEEN CRITICAL  
THINKING SKILLS AND PREFERRED LEARNING STYLES  
OF FIRST YEAR NURSING STUDENTS

by

Gloria J. Clocklin

A Dissertation  
Submitted to the  
Faculty of The Graduate College  
in partial fulfillment of the  
requirements for the  
Degree of Doctor of Education  
Department of Educational Leadership

Western Michigan University  
Kalamazoo, Michigan  
August 1995

AN EXPLORATION OF THE RELATIONSHIP BETWEEN CRITICAL  
THINKING SKILLS AND PREFERRED LEARNING STYLES  
OF FIRST YEAR NURSING STUDENTS

Gloria J. Clocklin, Ed.D.

Western Michigan University, 1995

The purpose of this study was to determine if a relationship existed between the manner in which nursing students preferred to learn and their ability to think critically. First year nursing students ( $N = 197$ ) from four colleges in a rural Midwestern geographic region were the subjects for the study. Students represented practical nursing, associate degree nursing, and baccalaureate degree nursing programs and were all in their first nursing course. Entire cohort groups from each college were included in the study.

The Kolb (1985) Learning Style Inventory and the Watson-Glaser Critical Thinking Appraisal (WGCTA, Watson & Glaser, 1980) were administered to all students. The variables for the study included the preferred learning style, WGCTA composite score, age, gender, type of nursing program, years of formal education, and number of years since last formal educational experience. Analysis of data was done using descriptive statistics and the analysis of variance (ANOVA). An alpha level of .05 was used for all statistical tests.

This study showed that a significant relationship appears to exist between critical thinking skills and preferred learning styles. This finding had not been previously documented in the literature. Students

categorized as divergers on the Kolb Learning Style Inventory had lower mean composite scores on the WGCTA than did those categorized as assimilators, accommodators, or convergers. Convergers had the highest mean scores. Age also was related to critical thinking scores with students over the age of 40 years having higher mean composite scores on the WGCTA than those under 40 years of age.

Additional studies in this area need to be done. If the findings can be validated in future studies, development of strategies to foster convergence in the nursing curriculum might be beneficial to increase critical thinking skills.

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## DEDICATION

To my mother, Blanche Hatton Clocklin

Uneducated by today's standards, she instilled in me at an early age, not only the love of books and learning, but also the belief that I could accomplish whatever goals I set for myself. Thank you--I know you would be proud at my attainment of this milestone--and I believe that somehow you know.

Richer than I you can never be--I had a mother who read to me.

--Strickland Gillian

Gloria J. Clocklin



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A special thanks to my advisor and committee chair, Dr. Uldis Smidchens. His encouragement and understanding kept me on track when the journey got tedious. Dr. Betty Hill, my dean and committee member, supported me in the day-to-day activities along the way and helped me keep sight of my goal. Thanks also to Dr. Eugene Thompson, committee member, for his feedback and suggestions.

Thanks go out to my family for understanding when phone calls replaced visits; to my friends, especially Gerry, Lois, Beth, and Jim, for accepting the reply "I can't, I need to study" so many times it must have sounded like a broken record; to all those who prayed for me along the way; and to the Marquette cohort for developing the strong support system which sustained all of us. Finally, thanks to Lee Pakko for the typing, proofreading, and finishing touches of this manuscript.

Gloria J. Clocklin

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## CHAPTER I

### INTRODUCTION

Critical thinking is an essential outcome of education. Educators at all levels and in all disciplines have been challenged to foster development of critical thinking skills in students. Nursing educators are no exception. Accrediting agencies mandate that critical thinking strategies be integrated across nursing curricula that prepare nurses for all levels of practice. Nurses need critical thinking skills to function in the complex, rapidly changing health care arena.

A decade has passed since the United States Department of Education (1983) published the proceedings of the National Commission on Excellence in Education entitled A Nation at Risk: Imperatives for Educational Reform. The American educational system as a whole has failed. Students are graduating from high school lacking the higher order intellectual skills needed to be competitive in a global society. It has been estimated that nearly 40% of graduating seniors are unable to draw basic inferences from written materials. These students arrive on the campuses of colleges and universities underprepared for the task of higher education.

Faculties often ask the question: "How can we best meet the needs of these students?" To answer this question, educational leaders are challenged to identify areas for research that will add to the knowledge base of how college students think and learn (Green & Stark,

1986). Development of strategies to facilitate the acquisition of higher order thinking skills is essential if college graduates are to compete in the workplace of the future.

Before new strategies can be developed, educators must understand more about the nature of higher order thinking and its relationship to a number of variables. The National Center for Research to Improve Postsecondary Teaching and Learning (NCRIPTAL) has identified variables in need of study to add to the knowledge base (Green & Stark, 1986). The investigation of the relationship between two of those variables, critical thinking and preferred learning styles, was the focus of this study. Therefore, the following questions were explored:

1. Is there a relationship between critical thinking skills and preferred learning styles?
2. Are critical thinking skills age related?
3. Are critical thinking skills gender related?
4. Do students choosing baccalaureate nursing education (BSN) have higher critical thinking skills than those choosing associate degree (ADN) or practical nursing (LPN) education?
5. Are critical thinking skills related to the number of years of formal education?

#### Significance of Study

"Our goal must be to develop the talents of all students to their fullest" (United States Department of Education, 1983, p. 13). How do educators accomplish this? An exploration of the relationship between critical thinking and preferred learning styles may provide direction

toward attainment of that goal. Can educators facilitate development of critical thinking skills by teaching two different learning styles? If there is a relationship between critical thinking skills and learning styles, that strategy might be valuable. Research about the relationship between these variables has not been explicitly documented in the literature. Information is needed to begin the knowledge base in this area.

Other factors contribute to the significance of this study. The demographics of college campuses have changed dramatically over the past two decades. The population is much more heterogeneous with a large percentage of nontraditional and ethnically diverse students. More students are underprepared for the rigors of higher education and are in need of remedial courses.

Colleges of nursing also reflect these changes. Nursing faculty are being challenged to become more student-centered and to respond to the diversity with teaching methods geared toward the needs of this new population. Health care has changed and the ability for nurses to think critically has never been more important.

### Critical Thinking and Preferred Learning Styles

As mentioned earlier, literature documents interest in critical thinking and learning styles in education and, more specifically, in nursing education. Critical thinking has been defined many ways. For the purpose of this study, critical thinking is:

a composite of attitudes, knowledge, and skills which include: (1) attitudes of inquiry that involve an ability to recognize the existence of problems and an acceptance of the general need for evidence in support of what is asserted to be true; (2) knowledge of the nature of valid inferences,

abstractions and generalizations in which the weight of accuracy of different kinds of evidence are logically determined; and (3) skills employed in the application of the above attitudes and knowledge. (Watson & Glaser, 1980, p. 1)

Learning style is the approach individuals use to gather and process information (Kolb, 1984). These constructs are discussed briefly by way of introduction and further developed in Chapter II.

Furedy and Furedy (1985) discussed the thoughts of ancient philosophers relative to critical thinking. That individuals must be able to think critically is an idea that has been supported throughout history. Socrates (cited in Furedy & Furedy, 1985) posited that "all traditions and assumptions must be open to critical examination." [Indeed,] "the uninquiring mind is not the life for man" (p. 54). Plato's philosophy was that education must not only pass on information but assist the student to question, examine, and reflect on ideas and values. Aristotle suggested that skills in abstract and logical thinking are required to think critically. Thoughts of these men of old have carried over into modern times.

The development of critical thinking skills in students is a challenge to all educators. The importance of critical thinking has been documented in literature by American educators for the past several decades. Dewey (1933) elaborated on the differences between process and product in thinking. It was his contention that education could either support or hinder the development of critical thinking skills. E. M. Glaser (1941) studied critical thinking in relation to one's ability to make inferences and assumptions, present an argument, evaluate conclusions, and reason. The works of other educational leaders (Ennis, 1962; Piaget, 1970) supported the basic positions of E. M. Glaser.



Leaders in nursing education have also supported the inquiry process and research in the area of critical thinking and ways to facilitate its development throughout the nursing curriculum (Berger, 1984; Kintgen-Andrews, 1988; C. Miller, 1986; Pardue, 1987). The ability to think critically is essential for nurses in the rapidly changing health care system. The technology explosion has made obsolete that which was known as fact less than 5 years ago. Nurses at all levels of educational preparation must be able to adapt to the ever-changing work environment and that requires critical thinking skills.

Attention to learning styles is gaining interest among educators as a way to maximize individual potential for success. Instruments have been developed by a number of researchers to categorize learning style (Canfield, 1980; Dunn, 1984; Gregorc, 1982; Kolb, 1976). These researchers suggested that a number of different abilities are needed to learn effectively but that individuals often have a preferred style with which they enter the learning cycle. It is hypothesized that individuals learn best when all phases of the learning cycle are developed even though a particular style may be preferred (Kolb, 1976). The Kolb Learning Style Inventory was used for this study.

The Kolb (1984) experiential learning model is based on two factors, the way individuals prefer to intake information and the way they prefer to process information. The model can be visualized as having a vertical and a horizontal axis. The vertical axis represents the intake of information with concrete experience (CE) at one pole and abstract conceptualization (AC) at the opposite pole. The horizontal axis represents the processing of information and has active experimentation

(AE) and reflective observation (RO) at the opposite poles. The model categorizes learners into four groups. Divergers are those who prefer to gather information as concrete experience and process it as reflective observers. The assimilator intakes information as abstract concepts and processes it as reflective observers. Convergers prefer abstract conceptualization as the mode of intake but prefer the active experimentation as the mechanism to process information. The last group, the accommodators, also process as active experimenters but prefer concrete experience as their method of intake.

The Kolb (1984) model further suggests that while individuals have preferred styles for learning, there are strategies which can strengthen the less preferred styles thus allowing individuals to become more balanced and successful learners. If a relationship between critical thinking skills and preferred learning styles can be supported, future studies can be developed to test whether critical thinking skills increase when teaching styles are congruent with preferred learning styles.

### Summary

Although critical thinking and preferred learning styles have been identified as constructs in need of research, nothing has been documented which looks specifically at the relationship between those variables. The purpose of this study was to explore that relationship in a population of first year nursing students. Chapter II outlines the previous research in the areas of critical thinking and preferred learning styles which served as the foundation for the theoretical framework of the study.

The methodology used in this study, including instrumentation and specific hypotheses proposed to answer the five primary research questions, is presented in Chapter III. Analysis of data follows in Chapter IV, with a synthesis of findings and recommendations presented in Chapter V.

## CHAPTER II

### REVIEW OF THE LITERATURE

The purpose of this study was to explore the relationship between critical thinking skills and preferred learning styles in first year nursing students. This chapter provides a review of the literature which helped form the theoretical framework for the study. Four major sections emerged as literature was reviewed: critical thinking as a general construct, critical thinking in nursing education, learning styles as a general construct, and learning styles in nursing research. Each of these major sections are discussed.

#### Critical Thinking: A General Construct

The belief that man must be able to think critically has been supported throughout history. Ancient philosophers like Socrates, Plato, and Aristotle pondered the nature of thinking and the role it must play in life (Furedy & Furedy, 1985). Since early times, the development of critical thinking skills has been a challenge to educators. The history of American education documented the importance placed on critical thinking by the innumerable studies which have been done. Though discussed through the ages, there is still a lack of consensus about the nature of critical thinking.

One of the key issues of debate among modern day scholars of critical thinking derives from the question: Is critical thinking general or

specific in nature? McPeck (1981) posited that critical thinking is subject specific.

Just as the rules of a particular game do not necessarily apply to other games, so certain principles of reason apply within some spheres of human experience but not in others. A principle of reason in business or law, for example, might be fallacious in science or ethics. (p. 71)

Specifically, McPeck defined critical thinking as "the skill and propensity to engage in an activity with reflective skepticism" (p. 81). Writings by Adler (1990) support the subject specificity stance taken by McPeck. An opposing stance is taken by a number of scholars in the modern critical thinking movement.

Ennis (1962, 1985), Siegel (1988), and Paul (1992) argued that critical thinking is general in nature and that there are a set of critical thinking skills which cross subject boundaries. Ennis (1985) defined critical thinking broadly as "reasonable reflective thinking which is focused on deciding on what to believe or do" (p. 45), while Siegel (1988) described critical thinking as being moved by reason. Another general definition proposed by Paul (1990) described specific attributes: "Critical thinking is disciplined self-directed thinking which exemplifies the perfection of thinking appropriate to a particular mode or domain of thinking" (p. 214). Paul (1992) elaborated by saying, "Critical thinking is thinking about your thinking while you're thinking in order to make your thinking better" (p. 7). Generic qualities which transcend rigid boundaries and permeate all areas of life form the basis for definitions of all these scholars. The strength of the arguments reported in the literature about the general nature of critical thinking were deciding factors in the definition used in this study.

Most research studies involving nursing education have subscribed to the general nature of critical thinking and have used the Watson-Glaser Critical Thinking Appraisal (WGCTA, Watson & Glaser, 1980) as the measurement of critical thinking skill. The number of studies reported in journals is still limited. Pertinent research findings related to critical thinking in nursing students are presented in the next section.

### Critical Thinking: WGCTA in Nursing Research

The acquisition of critical thinking skills is a necessary outcome in nursing education. A rapidly changing health care system, new technologies, and high acuity levels of patients in hospitals, long-term care, and the home make it essential that nurses be able to think critically. Studies related to critical thinking in nursing education cluster around two primary foci: changes in critical thinking as students progress through a course of study and comparison of critical thinking skills between students from different types of educational programs.

Berger (1984) tested a group of 137 baccalaureate students during their sophomore and senior levels. The mean composite scores on the WGCTA increased from 77 to 80. The change in mean scores was reported as significant at the alpha .05 level. Gross, Takazawa, and Rose (1987) conducted a similar study using the WGCTA with 60 associate degree (ADN) and 60 baccalaureate (BSN) nursing students. The ADN students were tested upon entry and exit from the nursing curriculum, while the BSN students were tested at entry and exit from the upper division nursing courses. Both groups had increased mean composite scores upon completion. These findings were interpreted by

the researchers as supporting their hypothesis that completion of the nursing program had a positive impact on critical thinking skills. C. Miller (1986) found similar increases in the critical thinking mean scores in a group of baccalaureate nursing students followed over the 4 years of their nursing education.

Several other studies were unable to document changes in critical thinking scores from entry to exit from a nursing program. Sullivan (1987) did a correlational study with a group of 51 RNs in a BSN completion program. The WGCTA was administered when the students began the program and again at graduation. Posttest scores showed little improvement in mean composite scores. Sullivan noted with interest that students returning to complete a BSN degree after many years of clinical practice had higher critical thinking scores on entry to the completion program than those who had completed their basic education more recently.

Bauwens and Gerhard (1987) administered the WGCTA to 145 graduates of a baccalaureate program during the first week of their upper division nursing courses and again at graduation. Using the  $t$  test and an alpha level of .05, they were unable to demonstrate significant change in mean scores of the WGCTA and concluded that specific nursing educational experiences do not produce gains in critical thinking ability.

Studies by Kintgen-Andrews (1988) and Brigham (1989) were also unable to find changes in WGCTA composite scores from entry to exit from a nursing program. Conflicting results in the research suggest that more controlled studies on larger samples are needed before findings can

be generalized to the nursing student population.

Comparison of critical thinking skills at different levels of nursing education was the second focus of literature reviewed. The nursing profession has multiple levels of entry into practice ranging from one-year certificate programs for practical nurses (LPN), two-year registered nurse programs (ADN), three-year registered nurse diploma programs, and four-year baccalaureate registered nurse programs (BSN). Several studies looked at the exit critical thinking scores of students from different types of nursing programs.

Fredrickson and Mayer (1977) analyzed the critical thinking scores from a sample of 27 ADN students and 28 BSN students and found that students from the baccalaureate program had higher mean scores than the associate degree students. Pardue (1987) studied 121 registered nurses who were graduates of associate degree, diploma, baccalaureate, and master's degree programs and found that graduates of the baccalaureate and master's degree programs had higher critical thinking scores. Kintgen-Andrews (1988) noted that second year baccalaureate students had higher scores than did the second year associate degree nursing students. These findings were further supported by Brooks and Shepherd (1990) in a study using a sample of 50 graduates each from diploma, associate degree, baccalaureate completion, and generic baccalaureate programs. It was found that students from the baccalaureate programs had higher mean scores than those from associate degree and diploma programs. There were no reports in the literature about studies which explored differences between preprogram scores among students of different types of programs. Because of this, it is difficult to interpret



the importance of postgraduation findings.

As previously mentioned, review of the literature failed to find any studies which looked specifically at the focus of this study, the relationship between critical thinking and learning styles.

### Learning Styles: A General Context

The topic of learning styles has been reported in literature for the past couple of decades. Guild and Garger (1985) discussed some of the early references to cognitive and/or learning styles in their book, Marching to Different Drummers. Jung (1923) was one of the earliest writers related to cognitive style. His work on psychological type is the framework for the Myers-Briggs Type Indicator which is used extensively in research (Myers, 1976). The instrument used in this study, the Kolb's (1985) Learning Style Inventory (LSI), also has its roots in Jungian thought (Kolb, 1976).

Research related to learning styles has taken several directions. Curry (1983) used the metaphor of an onion to describe the various aspects of research related to learning style. Research about basic characteristics of personality form the core. Information processing, social interaction, and instructional preferences form the other layers or levels of research about learning styles. Personality characteristics and information processing are key components of the model used for this study and are discussed further.

Personality characteristics form the framework of learning style research by Witkin (1954), Myers (1976), and several others. The work of Witkin categorized learning styles of individuals as field dependent or

field independent. Field dependent individuals depend heavily on their surroundings for making interpretations about the meaning of events, while field independents are relatively unaffected by the same. Individuals who tend to have predominantly field dependent characteristics are most apt to have careers in human services and other areas which depend on interactions with people. Individuals with predominantly field independent qualities tend to be involved in careers which require such analytic skills as mathematics, engineering, and science.

The work of Myers (1976) yielded the Myers-Briggs Type Indicator (MBTI) which categorizes individuals using Jungian principles related to the way they perceive things (sensing or intuition), the way they make decisions (thinking or feeling), their tendency toward introversion or extroversion, and their attitude toward life (judging or perceiving). The extensive work with the MBTI has contributed valuable insights about how one thinks and learns to both teacher and learner in the academic setting.

The Kolb (1984) Learning Style Model is one of the primary models which deal with information processing. Kolb's model categorizes learners in two distinct modes, how they perceive or gather information and how they process it. Like the MBTI, it was based on Jungian thought. Learners within the Kolb model are identified within one of four styles. The diverger is one who gathers information concretely and processes it reflectively. The assimilator perceives abstractly and processes reflectively, while the converger perceives abstractly but processes actively. The fourth style, the accommodator gathers information concretely and processes it actively. Kolb posited that all

individuals use the four styles of learning to some degree but that there is a preferred mode within which one most comfortably enters the learning cycle. He further postulated that individuals can strengthen their less preferred modes and become more balanced learners. If that assumption is valid, understanding of student learning styles can have profound implications in education.

Most of the research relating learning styles to nursing students has been based on the Kolb (1976) Learning Style Inventory (LSI). The next section highlights some of the pertinent findings of those studies.

#### Learning Styles: The Kolb LSI in Nursing Research

Nursing research related to learning styles has been reported over the past decade and focus on the relationships between preferred learning styles and a number of other variables. Studies explored the relationship between learning styles and several other variables. Learning styles differences in students from different types of nursing programs were the focus of several studies. Huch (1981/1982) administered the Kolb Learning Style Inventory to 163 students enrolled in generic baccalaureate and baccalaureate completion programs. Differences between the two groups were not found. Merritt (1983) conducted a similar study with 343 generic BSN and BSN completion students from six different schools. The Kolb LSI and the Canfield Learning Style Inventory were administered to both groups and the results compared. The Kolb LSI found the learning styles to be similar for both groups, while the results on the Canfield, which categorizes styles in another way, found some differences between the two groups. The conclusion of the

author was that further studies needed to be done with both instruments to validate the findings. King (1986) examined a number of variables in a group of 30 generic BSN and 49 RN-BSN completion students. Results found that while students between groups differed in ego development and life stages, their learning style preferences were similar.

Studies by Johanson (1988) and Laschinger and Boss (1989) yielded comparable results; that is, no differences were found between the preferred learning styles of generic nursing and RN students returning for a baccalaureate degree. Two studies compared the learning styles of baccalaureate and associate degree nursing students (Fojtasek, 1988; Laschinger & Boss, 1984). Again, differences were not found. All of the studies using the Kolb LSI to evaluate learning style indicate that the type of nursing program selected seems to be independent of learning style preference. Studies identified that the largest proportion of nursing students preferred the concrete experience in information gathering found in the diverger and accommodator styles.

Another group of studies explored the relationship between learning style and academic achievement. The results in this area are conflicting. Zemaitis (1987) and DeCoux (1990) did not find a relationship between learning style and achievement as measured by grade point average. Zemaitis studied 121 RN-BSN completion students, while DeCoux studied 113 associate degree nursing students. Studies by Johanson (1988) found that individuals with higher scores on the reflective observation scale had higher grade point averages (GPAs) than those with higher scores on the active experimentation scale. Nursing students in all of the studies were distributed across the four learning

styles with the largest proportion being accommodators and divergers.

Two other variables reported in the literature are matching of teaching/learning styles and learning styles as predictor of clinical specialty in nursing. McCormick (1987) and Hodges (1988) hypothesized that problem-solving abilities of students would increase when teaching style matched the preferred learning style of students. The hypothesis was not supported. Zemaitis (1987) was unable to substantiate the hypothesis that learning style influenced an individual's preference of clinical specialty in nursing.

### Chapter Summary

The literature related to critical thinking and learning styles in nursing is relatively new. Relationships between a number of variables have been studied and yield inconsistent results. Research thus far has focused on small samples of students. Critical thinking research has explored changes in critical thinking skills as students progress through a course of study and comparisons between students from different types of nursing programs. Learning style research in nursing education has focused on comparisons of students from different types of nursing programs, relationships between learning style and academic achievement, matching of teaching/learning styles, and learning style as predictor of clinical specialty.

While one study looked at learning style and problem-solving skills, no studies were found which explored the relationship between learning style and critical thinking. Because educators have long held that thinking and learning are closely related, it was surprising that no

studies have been done to determine if a relationship between the two can be documented.

After extensive review of the literature the question remains: Is there a relationship between critical thinking skills and preferred learning styles? That question was explored as the focus of this study. Specific hypotheses growing out of the review of literature are outlined in Chapter III. Methods and procedures used in data collection, population under study, instrumentation, and procedures for data analysis are also described. Discussion of results of data analysis follows in Chapter IV, with synthesis of findings and recommendations presented in Chapter V.

## CHAPTER III

### DESIGN OF THE STUDY

The purpose of this study was to explore the relationship between critical thinking skills and preferred learning styles in first year nursing students. Extensive review of literature failed to document that the relationship had ever been specifically explored in any population. The research project was approved by the Human Subjects Institutional Review Board of Western Michigan University under the exempt category in July of 1994 (see Appendix A).

#### Hypotheses

Five conceptual hypotheses with corresponding null hypotheses were developed from the research questions presented in Chapter I. An alpha level of .05 was used to test all of the null hypotheses. Listed below are the five research questions of the study with hypotheses proposed to answer each of the questions.

Question 1 asked: Is there a relationship between critical thinking skills and preferred learning styles? Critical thinking skills were operationalized as the composite score on the Watson-Glaser Critical Thinking Appraisal (WGCTA, Watson & Glaser, 1980) and preferred learning style as the category calculated on the Kolb (1985) Learning Style Inventory (LSI). The conceptual hypothesis of a relationship between critical thinking skills and preferred learning style was tested with the null

hypothesis: The mean composite score on the WGCTA is equal for the four preferred learning styles on the LSI.

Question 2 explored: Are critical thinking skills age related? Age was operationalized as one of three age ranges, ages 18-29 years, 29-40 years, and 40-51 years. A conceptual hypothesis of a relationship between critical thinking skills and age was tested with the null hypothesis: The mean composite score on the WGCTA is equal across age ranges.

Question 3 asked: Are critical thinking skills gender related? Gender was operationalized as the self-report of sex on the demographic data sheet. A conceptual hypothesis of a relationship between critical thinking skills and gender was tested with the null hypothesis: The mean composite score on the WGCTA is equal for male and female.

Question 4 queried: Do students choosing four-year baccalaureate nursing education (BSN) have higher critical thinking skills than those choosing two-year associate degree (ADN) or one-year practical nursing (LPN) programs. Category of nursing education was operationalized by the self-report of type of program on the demographic data sheet. The conceptual hypothesis of relationship between critical thinking skill and type of nursing program was tested with the null hypothesis: The WGCTA composite score will be the same for students from all types of nursing programs.

### Population

The target population for this study was all students in a rural geographic region of the Midwest enrolled in their first nursing course.



Data were collected from 197 students within the target population. Participation in the study was voluntary and six students choose not to participate. Three students were absent on the day of testing. Materials were left at the school to be administered individually but the forms were not returned. A total of 96% of the target population ( $N = 206$ ) was included in the study. Four schools of nursing: two community colleges, one private two-year college, and one state university participated in the study. Three types of programs were represented: baccalaureate (BSN), associate degree (ADN), and practical nursing (LPN). An earlier study with 60 students, 20 each from the same three types of programs had documented no significant differences in critical thinking skills or preferred learning style between students in the programs (Clocklin, 1992).

### Instrumentation

Three instruments were used in this study, the Watson-Glaser Critical Thinking Appraisal, the Kolb Learning Style Inventory-Revised, and a researcher designed demographic data questionnaire.

#### Watson-Glaser Critical Thinking Appraisal (WGCTA)

This instrument was designed to measure critical thinking as a general ability. It is the most widely used test of critical thinking reported in nursing research (Beck, Bennett, McLeod, & Molyneaux, 1992). The WGCTA is considered in Test Critiques (Sweetland & Keyser, 1984) to be the best instrument currently available. The instrument is standardized and consists of 80 questions divided into five

subtest sections: inference, recognition of assumptions, deduction, interpretation, and evaluation of arguments. Each subset has 16 items. A raw score is obtained for each subset and the sum of the subset scores yield the total critical thinking score. Norms are presented in the manual as percentile rank scores. While it is possible to look at the subset scores individually, norms exist only for the total scores. Norms have been established for nursing students in universities and students in junior and community colleges, as well as for other groups. Norms are not available by sex; however, studies have shown no consistent differences between males and females (Watson & Glaser, 1980). The WGCTA is written at the ninth grade reading level.

The WGCTA is suitable for individual or group administration. Administration of the instrument takes between 40 and 50 minutes. There are two forms of the instrument and there is a high degree of internal consistency between Forms A and B. Form A was used in this study. The validity of the WGCTA was determined through construct and content analysis and was found to be acceptable. Reliability has been described as adequate but has been addressed by reviewers as an area that should be studied more systematically and on a broader scale.

Despite the shortcomings identified, reviewers (Berger, 1984; Woehlke, 1985) agreed that the WGCTA is the best instrument available for measuring the complex construct of critical thinking.

#### Kolb Learning Style Inventory (Revised-1985)

The Learning Style Inventory-Revised (LSI-1985) was used to identify the preferred learning style. It is the most widely used

instrument to measure preferred learning styles in the field of nursing education (DeCoux, 1990; Laschinger, 1990). The LSI-1985 is a self-administered, 12-item profile which has been widely used in education and business. Normative data are available on a sample of 1,446 ethnically diverse adults, ages 18-60 years, male and female, from a wide range of career fields. Nurses were represented in about 13% of the normed population. The LSI-1985 was selected after review of several instruments as discussed in Chapter I. It was selected for its ease of administration and because many studies had been done using the instrument with nursing students.

The instrument yields four single scales: concrete experience (CE), reflective observation (RO), abstract conceptualization (AC), and active experimentation (AE), with scores ranging from 12 to 48 on each category. Additionally, two combined scores are obtained: abstract-concrete (AC-CE) and active-reflective (AE-RO). These combined scores can then be plotted on a grid to identify one of the four preferred learning styles previously identified.

The internal reliability of the scales and scores is said to be very good with the Cronbach's alpha ranging from .72 to .88. The combination scores measured by Tukey's test show almost perfect additivity. There is also a strong correlation (.87 to .93) between the original LSI and the LSI-1985. The Pearson correlations among the LSI-1985 show strong negative relationships between AC and CE and AE and RO. This follows the prediction of Kolb's (1985) experiential learning theory.

### Demographic Data Questionnaire

This researcher-developed questionnaire (Appendix B) provided information on possible intervening variables including age, sex, type of nursing program, class status, and the length of time between the last formal educational experience and entering the nursing program.

### Data Collection Procedures

After obtaining approval from the Human Subjects Institutional Review Board at Western Michigan University (Appendix A), a letter was sent to the program coordinators of each school requesting their participation in the study (Appendix C). A follow-up personal telephone call was made 2 weeks later to answer any questions they might have. Having gained permission from the appropriate individual in each nursing program, appointments were made for a time to administer the LSI-1985, WGCTA, and Demographic Data Questionnaire. A cover letter (Appendix D) explained the purpose of the study to the students and requested their participation. Participation in the study was voluntary and completion of the tests implied consent to use the data obtained. The researcher administered the instruments during a regularly scheduled class. To assure anonymity, the data collection sheets were numbered and no names were required.

The researcher administered the tests according to standardized instructions for each instrument. The LSI-1985 was administered first. It is short and relatively nonthreatening since it has no right or wrong answers. The WGCTA was then administered.

### Scoring of Watson-Glaser Critical Thinking Appraisal

The completed WGCTA were hand scored by the researcher using a template provided by the test publisher. The number of items correct in each subtest was summed to calculate the critical thinking score for each subject. The possible range of scores was from 0 to 80.

### Scoring of Kolb Learning Style Inventory

The LSI-1985 was hand scored by the researcher. The 12 numbers in the four columns were added to obtain CE, RO, AC, and AE scores. The raw scores ranged from 12 to 48 in each column. Combination scores were then calculated by subtracting AC - CE and AE - RO. The combination scores ranged from +36 to -36. The combination scores were plotted on a grid to determine one of four preferred learning styles: diverger, assimilator, converger, or accommodator.

### Method of Data Analysis

"Good planning in research . . . anticipates the problems of analysis of the data. Appropriate statistical techniques are foreseen and the manner of their application is specific" (Isaac & Michael, 1990, p. 157). Analysis of variance is the statistical method to test the hypothesis that the mean scores of all groups come from populations with equal means (Isaac & Michael, 1990). The mean composite score on the WGCTA was the dependent variable in this study and the independent variables included preferred learning styles, gender, age range, type of nursing education, and number of years of formal education. The one-way

analysis of variance (ANOVA) is appropriate when independent variables have two or more levels (Hinkle, Wiersma, & Jurs, 1988). Variables in this study met the criteria above and the one-way ANOVA was deemed the most appropriate test for data analysis.

Having decided the methods for statistical analysis, raw data for each subject were coded and entered into a data set. The data were then analyzed using the Statistical Package for Social Science (SPSS-X, Norusis, 1990) on a mainframe computer.

#### Summary of Chapter

Within this chapter, five research questions were discussed. Conceptual hypotheses, operationalization of terms, and statement of null hypotheses to test the research questions were presented. Discussion of the population studied, instrumentation, data collection procedures, and method of data analysis completed the chapter. In Chapter IV, discussion of the results of data analysis are presented. Synthesis of the findings and recommendations are the focus of Chapter V.

## CHAPTER IV

### PRESENTATION OF RESULTS

The purpose of this study was to explore the relationship between critical thinking skills and preferred learning styles of first year nursing students. This chapter contains a discussion of the results. It is divided into three parts: demographics, research questions, and related hypotheses. It concludes with a summary of the chapter.

#### Demographics

The population for this study consisted of 197 first year nursing students enrolled in four schools of nursing in a rural geographic area of the upper Midwest. Students from three types of nursing programs were represented, 88 LPN, 51 ADN, and 58 BSN. The range of ages among the students was 18-51 years with 56% being between 18 and 29, 31% between 29 and 40, and 12% between 40 and 51. The mean age was 28.5 years. There were 84% females ( $n = 166$ ) and 16% males ( $n = 31$ ). It had been at least 5 years between the last formal educational experience and entering the nursing program for the majority of subjects ( $n = 174$ , or 88%).

#### Research Questions and Related Hypotheses

Research Question 1 asked: Is there a relationship between critical thinking skills and preferred learning styles? Critical thinking

skills were operationalized as the composite score on the Watson-Glaser Critical Thinking Appraisal (WGCTA, Watson & Glaser, 1980) and preferred learning style as one of the four categories on the Kolb (1985) Learning Style Inventory (LSI-1985). The conceptual hypothesis stated that there was a relationship between critical thinking skills and preferred learning styles. This was tested with the null hypothesis: The mean composite score on the WGCTA is equal for the four preferred learning styles on the LSI-1985.

The one-way analysis of variance (ANOVA) was used to test the null hypothesis. The ANOVA test produced a probability of .003 which is less than the alpha .05 selected. Therefore, analysis of the data revealed that a relationship does exist between critical thinking skills and preferred learning styles as operationalized in this study. The Cochran C test for homogeneity of variance produced a probability of .81 which means that the assumption for homogeneity of variance needed for the ANOVA was met.

Analysis using the LSD procedure revealed that students categorized as divergers on the Kolb LSI-1985 had lower scores on the WGCTA composite than did those categorized as assimilators, convergers, or accommodators. WGCTA mean scores by learning style preference are summarized in Table 1.

The hypothesis of no difference on the WGCTA mean composite scores for the four categories of learning styles was rejected at the alpha .05 level of confidence. A relationship between critical thinking skills and preferred learning styles was supported in this study.



Table 1  
WGCTA Mean Composite Scores and Standard Deviations by  
Preferred Learning Style

Learning style	Number	Mean	<u>SD</u>
Diverger	57	49.33	8.52
Assimilator	55	52.90	8.64
Converger	31	56.79	8.73
Accommodator	54	52.85	9.47

\* $p = .003$ --null hypothesis rejected.

Research Question 2 asked: Are critical thinking skills age related? Using the one-way ANOVA, the following null hypothesis was tested: The mean composite score on the WGCTA is equal across age ranges. Subjects 40 years of age and older had higher mean composite WGCTA scores than did those subjects under 40 years of age. The ANOVA produced an  $F$  probability of .004. This finding was accepted with caution since the Cochran C test for homogeneity of variance was very low (.59,  $p = .07$ ). However, since the  $p = .004$  is much lower than the alpha .05 used in this study, the null hypothesis was rejected. Table 2 summarizes the means and standard deviations for this hypothesis.

Research Question 3 asked: Are critical thinking skills gender related? Gender was operationalized as the self-report of sex on the demographic data sheet. A conceptual hypothesis of a relationship between critical thinking skills and gender was tested with the null

Table 2  
WGCTA Mean Composite Scores and Standard Deviations  
by Age Range

Age range	Number	Mean	<u>SD</u>
18-29 years	113	51.04	8.15
29-40 years	62	53.08	9.41
40-51 years	23	57.65	10.94
Total	197	52.45	9.11

\* $p = .004$ --null hypothesis rejected.

hypothesis: The mean composite score of the WGCTA is the same for male and female. Males had slightly higher mean composite scores on the WGCTA; however, a probability of .16 was obtained using the one-way ANOVA. Since this was higher than the alpha .05 established for this study, the null hypothesis was not rejected. Table 3 summarizes the means and standard deviations for this hypothesis.

Table 3  
WGCTA Mean Composite Scores and Standard  
Deviations by Gender

Sex	Number	Mean	<u>SD</u>
Female	166	52.06	8.79
Male	31	54.55	10.57
Total	197	52.45	9.11

\* $p = .16$ --null hypothesis not rejected.

Research Question 4 asked: Do students choosing four-year baccalaureate nursing education (BSN) have higher critical thinking skills than those choosing two-year associate degree (ADN) or one-year practical nursing (LPN) programs? Category of nursing education was operationalized by the self-report of program type on the demographic data sheet. The conceptual hypothesis stated that there was a relationship between critical thinking skills and the type of program selected. The null hypothesis was that there were no differences in the critical thinking scores of students from different types of nursing programs. The null hypothesis was tested using the one-way ANOVA. There were minimal numerical differences in the scores but the calculated  $F$  probability was .58, which was far greater than the established alpha level of .05. Table 4 summarizes the mean composite scores and the standard deviations for this hypothesis. The null hypothesis was not rejected.

Table 4  
WGCTA Mean Composite Scores and Standard Deviations  
by Type of Program

Type of program	Number	Mean	<u>SD</u>
LPN	88	52.25	8.05
ADN	51	53.56	9.99
BSN	58	51.81	9.87
Total	197	52.45	9.11

\* $p$  = .58--null hypothesis not rejected.

The final question, Research Question 5 asked: Are critical thinking skills related to the number of years of formal education? Information was gathered from the demographic data sheet to identify the total number of years of formal education students had. While all of the students were in their first nursing course, they had varying numbers of years of formal education. The conceptual hypothesis was that there was a relationship between total years of formal education and critical thinking skills. Years of formal education was operationalized to mean the class standing based on number of credit hours earned. The null hypothesis to test this question was: The mean composite score on the WGCTA will be the same regardless of the number of years of formal education. The one-way ANOVA was used to test the hypothesis. The exact  $E$  probability reached .46 and the null hypothesis was not rejected. Table 5 summarizes the mean and standard deviations of the WGCTA for the five categories for years of education.

Table 5  
WGCTA Mean Composite Scores and Standard Deviations  
by Class Standing

Class standing	Number	Mean	<u>SD</u>
Freshman	82	52.44	8.99
Sophomore	77	51.39	9.48
Junior	20	55.10	8.07
Senior	9	55.33	6.71
Graduate	9	53.00	11.21

\* $p$  = .46--null hypothesis not rejected.

## Chapter Summary

This chapter contains the findings of the study which explored the relationship between critical thinking skills and preferred learning styles in first year nursing students. A relationship between critical thinking skills and preferred learning styles was established when the null hypothesis was rejected. Analysis of data testing that hypothesis documented that the differences in the mean composite scores on the WGCTA were not likely to have happened by chance. This finding was significant since such a relationship had not been previously documented in the literature.

Age also appears to be a factor in critical thinking skills. Older students had higher mean composite scores on the WGCTA than did younger students. These findings support an earlier study by Pearson (1991), who found that there was a marked increase in critical thinking scores in students 30 years and older.

Relationships between critical thinking skills and gender, type of nursing program, and number of years of formal education could not be substantiated at the alpha .05 level and those null hypotheses were not rejected. Chapter V presents the summary, conclusions, and final recommendations based on the study.

## CHAPTER V

### SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The primary focus of this study was to determine if a relationship existed between critical thinking skills and preferred learning styles in a population of first year nursing students enrolled in schools of nursing in a rural geographic region of the upper Midwest. Students from three types of nursing programs were represented: practical nursing, associate degree nursing, and baccalaureate nursing. The Watson-Glaser Critical Thinking Appraisal (WGCTA, Watson & Glaser, 1980) and the Kolb Learning Style Inventory-1985 (LSI, Kolb, 1985) were administered. Demographic data about gender, age, type of program, years of formal education, and length of time since last formal educational experience was also collected.

Data were coded and entered into the Statistical Package for Social Science (SPSS-X, Norusis, 1990) program on a mainframe computer. Statistical analysis was done using the one-way analysis of variance (ANOVA) to test the null hypotheses. The null hypothesis related to the relationship between critical thinking skills and preferred learning styles was rejected at the alpha .05 level of confidence. Learners categorized as divergers had much lower composite scores on the WGCTA than did those categorized as accommodators, assimilators, or convergers. Highest scores were received by the convergers who also made up the smallest group in the study. A relationship between critical

thinking skills and age was also established. Students over 40 years of age had higher critical thinking skills than younger students. Further discussion of the conclusions of the study follows in the next section of this chapter.

### Conclusions Related to Research Questions

Research Question 1 explored the relationship between critical thinking skill and preferred learning style. Analysis of data suggested that a relationship does exist. No other studies were found which specifically explored the relationship between these two variables so the findings add new information to the available knowledge base of critical thinking. Because the sample size was small and the population limited to nursing students, care must be taken not to generalize these preliminary findings without further studies which substantiate the results. Taken within the context of preliminary findings, a direction for further research has been established.

Research Question 2 had a focus on the relationship between critical thinking skills and age. Findings were that a relationship does exist between critical thinking skill and age. Caution was exercised in accepting this finding since the Cochran C test for homogeneity of variance among the groups by age was very low. This increases the probability of Type I error (Isaac & Michael, 1990). Previous studies yielded inconsistent results; Gross et al. (1987) and Lynch (1988) were unable to document a strong relationship between critical thinking ability and age of nursing students, while Pearson's (1991) work suggested that a relationship does exist. These inconsistencies suggest that the

variables of age and critical thinking abilities must be studied further before definitive conclusions can be made.

Research Question 3 asked whether gender plays a significant role in critical thinking abilities. This study was unable to document a relationship and the null hypothesis was not rejected. No studies were found which confirm or dispute this finding. Because men make up the minority in nursing, the numbers may not be sufficient to make a strong case for or against a relationship between the variables of critical thinking and gender.

Research Question 4 looked for differences in critical thinking skills among students of three different types of nursing programs. Differences at the alpha .05 level were not documented. Previous studies reported in the literature (Brooks & Shepherd, 1990; Fredrickson & Mayer, 1977; Kintgen-Andrews, 1988; Pardue, 1987) all found differences between the critical thinking abilities of students from different program types. A couple of possible reasons for this discrepancy exist. The studies mentioned all looked at exit critical thinking scores as opposed to the entry critical thinking score in this study. The longer programs of study in BSN and master's degree programs might account for the increased scores over the two year associate degree graduates. Another possibility relates to the rural setting from which the population of students in this study were selected. Each nursing program represented in this study is at least 100 miles from another college or university with a nursing program. Since there were a large number of nontraditional students in the sample, the type of educational program selected by students may have more to do with availability than preference for



one type of program over another.

Research Question 5 looked at the relationship between critical thinking scores and the number of years of formal education prior to entering the nursing program. Students entering nursing programs come from diverse backgrounds and many have attended college prior to actual admission to first level nursing courses. The majority of students in this study had at least 2 years of college and some had degrees in other disciplines. As an educator, it was somewhat disturbing to find no significant relationship between critical thinking scores and the number of years of education. There are a couple of possible explanations for this finding. First, perhaps education is failing in the task of developing critical thinking skills among students. If that is the case, the importance of this study increases since it gives some new insights into a relationship not previously reported, that of learning style and critical thinking ability. A second possibility is that the type of critical thinking which develops in schools of nursing cannot be measured with the WGCTA. McPeck (1981) posited that critical thinking is discipline specific and if that supposition is true, then an instrument such as the WGCTA which measures critical thinking as a general construct would be inappropriate to measure the changes which take place in critical thinking related to nursing education.

Based on the findings and conclusions of this study, several recommendations and questions were raised.

### Recommendations

The relationship between critical thinking and preferred learning styles has not been documented previously in the literature. The findings are thus considered preliminary and suggest that the study should first be replicated with a larger sample. If the findings of this study are supported in future studies, nursing faculty should look for ways to strengthen students' ability to "see the big picture" which is the hallmark of the convergers who achieved the highest mean scores on the WGCTA.

Nursing has traditionally been a hands-on profession and many students have difficulty understanding why a strong theoretical base is needed to care for acutely ill patients. Nursing faculty can do much to model the skills of critical thinking in the classroom and clinical setting. Requiring students to question, probe, and explore creative alternatives fosters critical thought. Use of simulations and case studies in the classroom requires active as opposed to passive learning.

It is further recommended that an instrument which measures critical thinking in nursing be developed. An assumption of this study was that critical thinking is a general construct and crosses disciplinary boundaries. Perhaps this assumption is wrong and critical thinking is discipline specific in higher education. It may be that there are some principles of critical thinking which cross disciplines but others which are discipline specific as proposed by McPeck (1981).

The need for nurses to think critically has never been more important. Health care delivery is changing at a rapid pace and new

technologies are developed annually. Nursing faculty are preparing students for an unknown future workplace. Critical thinking skills are the very foundation for success in an ever changing world and education must foster their development. This study has found a relationship between critical thinking skill and preferred learning style which had not previously been documented. Further studies to validate and explore that relationship are needed.

## APPENDICES

**Appendix A**  
**Human Subjects Institutional Review**  
**Board Approval**

Human Subjects Institutional Review Board

Kalamazoo, Michigan 49008-3899  
616 387-8293

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## WESTERN MICHIGAN UNIVERSITY

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Date: July 8, 1994

To: Gloria Clocklin

From: Kevin Hollenbeck, Chair *fr for K. Hollenbeck*

Re: HSIRB Project Number 94-07-03

This letter will serve as confirmation that your research project entitled "An exploration of the relationship between critical thinking skills and preferred learning styles of first year nursing students" has been **approved** under the **exempt** category of review by the Human Subjects Institutional Review Board. The conditions and duration of this approval are specified in the Policies of Western Michigan University. You may now begin to implement the research as described in the application.

You must seek reapproval for any changes in this design. You must also seek reapproval if the project extends beyond the termination date.

The Board wishes you success in the pursuit of your research goals.

Approval Termination: July 8, 1995

xc: Smidchens, Ed. Lead.

**Appendix B**  
**Letter to Participants With Demographic**  
**Data Sheet**

Dear Nursing Student;

Thank you for your willingness to participate in my doctoral study exploring the relationship between preferred learning styles and critical thinking skills in nursing students. As a nurse educator, finding ways to facilitate and enhance learning in students is of prime importance. Your participation in this study should contribute valuable information about the ways nursing students think and learn.

All data will be anonymous. I do not know the names of individual students participating. The information requested below will be the only identifying factors. Completion of the survey and tests implies consent for the data to be used in this study. PARTICIPATION IN THIS STUDY IS VOLUNTARY. Students who prefer not to participate may place their sheets in the box provided.

PLEASE COMPLETE THE FOLLOWING INFORMATION:

ID# \_\_\_\_\_

Age: \_\_\_\_\_

Sex: (circle one)      Female Male

Type of Nursing Program: (circle one)      LPN    ADN    BSN

School: (circle one)    NMU      GCC    BdNCC      SC

Class Standing: (circle one)

Freshman      (less than 28 credit hours)

Sophomore:      (28-56 credit hours)

Junior:      (56-88 credit hours)

Senior:      (greater than 88 credit hours)

College graduate

Prior to entering this nursing program, how long had it been since you were last formally enrolled in school of any type? (circle one)

less than 1 year    1-5 years      5-10 years      more than 10 years



**Appendix C**  
**Letter of Introduction to Nursing  
Program Directors**

Dear Colleagues;

I am entering the dissertation phase of my doctoral studies in educational leadership and am requesting your support in obtaining subjects for my research. My study will explore the relationship between critical thinking skills and preferred learning styles. It is my desire to include students enrolled in the first year of nursing courses from each of the three regional nursing programs. As part of my study, I would like to administer the Watson-Glaser Critical Thinking Appraisal and the Kolb Learning Style Inventory to these students. It will take about one hour to complete.

As you are aware, our accreditation boards require us as nurse educators to facilitate the development of critical thinking skills in our students to prepare them to be skilled practitioners in a rapidly changing health care environment. The demographics of our students are changing. As educator's, we must be cognizant of ways to maximize potential of our students. I believe this study will add to our understanding of how students learn best. Although the data collection will be anonymous, I will be able to separate out the data according to school. I will prepare a written report for each individual school which could be incorporated into various reports as baseline information.

Thank you for considering my request. I will be in contact with you by phone within a couple of weeks to discuss setting up a time to administer the instruments.

Sincerely;

Gloria Clocklin, RN, MSN

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